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DEATH OF HER MAJESTY QUEEN MARY

The following letter was addressed by the Chairman of the Council to Sir Alan Lascelles on the occasion of the death of Her Majesty Queen Mary:

27th March, 1953

SIR,

The Council of the Royal Society of Arts beg that you will convey to Her Majesty The Queen the respectful and heartfelt sympathy of the Society in the loss sustained by the Royal Family and the whole Nation through the death of Her Majesty Queen Mary, whose long life and gracious and devoted service uniquely endeared her to all the peoples of the Commonwealth.

Among Her late Majesty's wide interests, art, in its many forms, and the promotion of industry, found a prominent and continuing place and we are happy to remember Queen Mary's many visits to the Exhibitions of the Society's Competition of Industrial Designs and her acceptance of the award of the Albert Medal in recognition of Her Majesty's "unremitting interest in arts and manufactures".

It is, therefore, with a special sense of loss that we desire to record our profound sorrow at her passing.

I have the honour to be, Sir,

Your obedient Servant,

E. MUNRO RUNTZ,

Chairman of the Council

The Right Honble. Sir Alan Lascelles,
G.C.V.O., K.C.B., C.M.G., M.C.,
Buckingham Palace, S.W.1.

FORTHCOMING MEETINGS

WEDNESDAY, 15TH APRIL, AT 2.30 p.m. "*Materials Handling and Processing—Past and Present*", by L. Landon Goodman, B.Sc., A.M.I.Mech.E., A.M.I.E.E., of the British Electrical Development Association. Lieut.-General Sir Thomas Hutton, K.C.I.E., C.B., M.C., General Manager, British Productivity Council, will preside. (The paper will be illustrated with lantern slides.)

*WEDNESDAY, 22ND APRIL, AT 2.30 p.m. "*Buckingham Palace*", by H. Clifford Smith, M.A., F.S.A. The Right Honble. the Earl of Cromer, P.C., G.C.B., G.C.I.E., G.C.V.O., will preside. (The paper will be illustrated with lantern slides.)

THURSDAY, 23RD APRIL, AT 5.15 p.m. COMMONWEALTH SECTION. THOMAS HOLLAND MEMORIAL LECTURE. "*Colonial Universities To-day*", by Sir Alexander Carr-Saunders, M.A., F.B.A., Director, London School of Economics. The Right Honble. Lord Hemingford, M.A., late Rector, Achimota Training College, will preside. The lecture will be illustrated with lantern slides. (Tea will be served from 4.30 p.m.)

*MONDAY, 27TH APRIL, AT 6 p.m. The first of three CANTOR LECTURES on "*The Novel*", entitled "*The Novelist's Task*", by Dennis Wheatley.

The second and third lectures in this series, on the subjects of "*The Function of the Publisher*" and "*The Bookseller and the Reading Public*", will be delivered by Michael Joseph and Christina Foyle on the 4th and 11th May respectively.

WEDNESDAY, 29TH APRIL, AT 2.30 p.m. SIR WILLIAM JACKSON POPE MEMORIAL LECTURE. "*The Scientist's Place in the Services*", by O. H. Wansbrough-Jones, C.B., O.B.E., M.A., Ph.D., Chief Scientist, Ministry of Supply. General Sir Kenneth Crawford, K.C.B., M.C., Controller of Supplies (Munitions), Ministry of Supply, will preside.

*Fellows may reserve seats for this meeting if they wish.

INDEX AND BINDING CASES FOR THE JOURNAL

The Index for Volume C of the *Journal*, which is now available may be obtained, without charge, together with the title page to the volume for binding purposes, on application to the Secretary. Binding cases for the complete volume may be obtained likewise, at a cost of 4s. 6d. post free.

953 AUSTRALIAN GOLD

A paper by

J. A. DUNN, D.Sc., D.I.C., Hon.M.Aust.I.M.M.

*Chief Mineral Economist, Bureau of Mineral Resources,
Australian Department of National Development, read to
the Commonwealth Section of the Society, by G. F.
Rudduck, B.Arch., F.R.A.I.A., M.P.I., Director of
Regional Development, Australian Department of National
Development, on Tuesday, 9th December, 1952, with Sir
Selwyn Selwyn-Clarke, K.B.E., C.M.G., M.C., M.D.,
F.R.C.P., Chairman of the Commonwealth Committee,
in the Chair*

THE CHAIRMAN: In order to mark the centenary of the discovery of payable gold in Australia, the Commonwealth Committee of this Society thought it fitting that a paper on the subject should be read to the section. To this end an approach was made to the Australian High Commissioner, and His Excellency kindly persuaded Dr. J. A. Dunn to produce an address. I should tell you that Dr. Dunn is the chief mineral economist in the Bureau of Mineral Resources of the Department of National Development, which has its headquarters at Canberra. Dr. Dunn is unfortunately unable to be with us this evening, but Mr. Grenfell Rudduck has most generously stepped into the breach and undertaken to read the paper for him. When I say that Mr. Rudduck is the Director of Regional Development in the same Department as Dr. Dunn, I am sure that you will agree that he makes an excellent substitute.

The word gold must conjure to the minds of most of us a number of varied pictures: from one's childhood when one's nanny told one to be "as good as gold" if one wanted a bedtime story; from one's early manhood, at the beginning of the First World War, when the gold sovereign disappeared from circulation and paper notes took its place; from the middle 'thirties, when Great Britain went off the gold standard, right down to the present day when the mighty dollar means so much in world affairs as compared with the pound sterling.

At whatever age you like to choose, gold, and the quest for it, are full of romance, and I am sure we are in for an entertaining and instructive lecture in listening to Mr. Rudduck.

The following paper was then read:

THE PAPER

A century has passed since payable gold was first found in Australia, in 1851. It is of interest to look back and consider the deep significance which the gold-mining industry has had for Australia, and to review its present and possible future development.

Settlement in Australia in those eighty years before the finding of payable gold was almost entirely rural. There had been some mining for coal and base metals,

but the economy was based on pastoral and agricultural pursuits. The population in 1850 had reached the figure of only 405,000, and the rate of increase was very small indeed. The gold rush meant a rapid increase in population—to 1,146,000 by 1860, to over 2 million by 1880, and to about 3 million by 1890. Prospecting for gold led to the discovery of other metals and minerals, to the development of other industries which serviced the expanding mining industry, and to the opening up of new settlements scattered over a large part of Australia. Undoubtedly, the discovery of gold was responsible for a far more rapid development of Australia than would otherwise have taken place. To-day, although perhaps its importance has dwindled, there are large areas of Australia the development of which is still dependent on the continuation of gold mining.

In the years preceding 1851 there had been records of gold occurrences in various parts of Australia. Apparently the earliest such record is that by a surveyor, James McBrien, who identified gold along the Fish River between Rydal and Bathurst, New South Wales, on the 15th February, 1823. Probably the first discovery which gave rise to actual mining operations was at a place about 10 miles east of Adelaide, South Australia, in January, 1846. But the discovery which finally established the occurrence of payable gold in Australia, and to which is credited the foundation of the gold industry, is that notified to the Government of New South Wales on 3rd April, 1851, by E. H. Hargraves. Hargraves' find was at the junction of Summerhill and Lewis Ponds Creeks, Bathurst district, New South Wales. The gold rush to this locality led to widespread prospecting.

In Victoria, the Hon. W. Campbell had discovered gold near Clunes in March, 1850, but he did not disclose the find until 8th July, 1851, a few days after the Colony of Victoria was separated from New South Wales (1st July, 1851). Shortly after this disclosure gold was found also at Ballarat and Bendigo, where the yields far outstripped those of other localities. These two towns in Victoria soon became the main gold-mining centres of those early days.

New discoveries were almost continuous, some small, some large. Perhaps the more important were Canoona (Queensland) in 1858, Forbes (New South Wales) in 1862, Gympie (Queensland) in 1868, Charters Towers (Queensland) in 1872, Mt. Morgan (Queensland) in 1882, and Mt. Lyell (Tasmania) in 1886. There was no mining in Western Australia for many years, although specimens of gold had been found; however, the Kimberley field was discovered in 1886, the Yilgarn field in 1887, and Coolgardie in 1892, and in May 1893, Hannon and Flanagan found the famous field at Kalgoorlie.

The Kalgoorlie field has been the last discovery of a major gold-field in Australia, but many profitable mines have since been opened up in widely scattered parts of Australia, some of them in recent years.

PRODUCTION

The production of gold in the Australian States since official records were first kept is shown in the accompanying Table. In the early days of gold-mining, considerable amounts of gold were not recorded and were taken out of the

country by the miners. The value of the total recorded output for Australia as a whole in the century of production to 1950 is of the order of £800 million.

AUSTRALIAN GOLD PRODUCTION (FINE OZ.)

Decade	Queensland	N.S.W.	Victoria	Tasmania	S.A.	W.A.	Northern Territory	Total
1861-1866 ...		2,714,531	21,973,409					24,687,940
1861-1870 ...	*519,057	3,219,658	15,327,317	†3,999	129,481			19,199,512
1871-1880 ...	*2,500,000	2,019,116	9,563,980	†180,179	6,843		18,610	14,288,728
1881-1890 ...	3,258,938	1,013,846	6,689,175	†404,993	58,071	42,016	167,937	11,634,976
1891-1900 ...	5,647,575	2,432,327	7,040,035	550,493	51,777	5,251,670	213,522	21,187,399
1901-1910 ...	5,511,742	2,252,851	7,095,062	604,127	73,000	17,783,814	111,558	33,432,154
1911-1920 ...	2,263,322	1,145,185	3,066,912	202,021	55,018	10,670,792	23,035	17,426,285
1921-1930 ...	433,825	203,622	593,177	43,355	10,318	4,556,673	2,182	5,843,152
1931-1940 ...	1,020,834	568,589	1,052,097	130,556	53,495	8,474,093	83,823	11,383,487
1941-1950 ...	750,656	571,286	800,187	156,256	10,979	6,683,383	148,354	9,121,101
TOTAL	21,905,949	16,141,011	73,201,351	2,275,979	448,982	53,462,441	769,021	168,204,734
1951 ...	78,580	48,895	66,063	14,446	362	648,245	38,945	895,536

*Estimate of possible allocation of total production of 3,019,057 oz. to 1880.

†Tasmanian Mines Department statistics.

The production of gold in Victoria to 1950, 73,201,351 ounces, has far surpassed that of any other State over the century. However, output in this State is now only 60,000-70,000 ounces a year. Western Australia has been the main producing State for the last fifty years, with a total of 53,462,441 ounces since gold mining first commenced in that State in 1886. It is likely that another thirty years will elapse before the total yield of Western Australia outstrips that of Victoria.

Victoria continued as the dominant producer until towards the end of the nineteenth century, when the rising output in Western Australia put that State in first position. The zenith of recorded production was 3,863,209 ounces in 1903, during a period when the gold-fields of Western Australia and Queensland were in their heyday, and before the rapid decline of Victorian production had set in. The rise in production at the end of the century was probably due in no small measure to the collapse of the banking structure in 1893, following the land boom of the early 'nineties. Relief to resulting distress was provided by diverting employment to the gold industry. During this last decade of the nineteenth century the total gold output was valued at £232 million and was a considerable factor in the recovery of the country from the financial collapse.

From the peak production early in this century the decline in gold yield was consistent in all States, and was accelerated perhaps by the shortage of manpower in the 1914-18 war. Annual production fell below one million ounces; it was as low as 757,400 ounces in 1921, and by 1929 reached a nadir of 429,667 ounces,

immediately before the world depression. This decline in output had become so serious during the 'twenties that in 1925 the industry was freed from income tax in the endeavour to attract more capital for further development. Early in the depression, the overseas price of gold rose and the depreciation of the Australian pound with respect to sterling made many previously marginal mines more attractive. The depression also diverted many unemployed to gold-mining. The gold yield steadily improved through the 'thirties and in each of the years 1939 and 1940 was 1,645,000 ounces.

The drain of manpower away from gold-mining in the 1939-45 war was a heavy set-back from which the industry has not recovered, and shows no signs of recovering. Many mines were closed down, or placed on a caretaker basis; by 1944 production had fallen to 657,000 ounces, and this level of output was maintained only because it was essential to keep in existence certain townships whose population depended wholly on adjacent mines for their livelihood. After the war production increased to 935,520 ounces in 1947 and exploration, development, and general interest in gold-mining was so active that there were hopes of the yield climbing again to pre-war levels. However, rising costs of production of a commodity whose official price has remained at the pre-war level, \$35 an ounce, quickly stifled those hopes. Several important mines became marginal and by 1948 a subsidy from the Commonwealth Government became necessary to keep some of these mines in production. The rise in the Australian price of gold to £A15 9s. 10d. following devaluation of sterling towards the end of 1949, improved the position of all mines for a time, but an acceleration of rise in costs soon cancelled out the benefit and in 1950 output had fallen back to 867,837 ounces. It was slightly better in 1951, at 895,538 ounces, but the marginal position of a number of mines in 1952 is little different from that in 1948.

REGIONAL AND GEOLOGICAL DISTRIBUTION

In Australia gold occurrences are scattered over three main regions: (a) a western region in Western Australia extending from Norseman in the South to Marble Bar in the North; (b) a northern region extending from the Kimberley division in Western Australia east into the northern section of the Northern Territory; and (c) an eastern region extending inland around the eastern coast from Queensland south to Victoria. Each region has characteristic geological associations.

In the western region the rocks are of Pre-Cambrian age, and are represented mainly by belts of old lavas (greenstones) and associated rocks extensively intruded by granite and allied rocks. The most productive ore-bodies have been replacement lodes, some of which, as at Kalgoorlie, contain gold tellurides. In addition, highly folded rocks, including banded ferruginous quartz rocks, are gold-bearing where there has been replacement. Gold is also associated with quartz reefs. The climate of this region is arid, so that alluvial gold has not been widespread, but some eluvial gold has been found near outcrops of lodes and quartz reefs. In the oxidized zone there has been a certain amount of secondary enrichment.

The rocks in the northern region are also of Pre-Cambrian age. Here, the

deposits have been smaller in general than in the western region, but several rich ore-bodies have been worked. The country rocks are similar in type to those in the western region. Replacement lodes and quartz reefs occur, but few have been mined to depths exceeding 100 feet. Parts of the region are relatively difficult of access and several deposits are known which may not be economic to work at present, but there may be possibilities of wider production in the future.

In the eastern region, where the full geological time scale is represented, the geology is more complex but the primary gold deposits occur in Paleozoic rocks which have been intruded by granites and associated rocks. In Victoria, gold production has been largely from quartz reefs and alluvial deposits, the quartz reefs of Bendigo and Ballarat being the most important. In Tertiary times alluvial deposits carrying rich gold along river valleys were covered by basalt flows; these buried deposits are known as deep leads. In New South Wales replacement lodes of gold and copper have been worked in the Cobar-Nymagee-Cambelago area, but in general quartz reefs have not been important in this State. In Queensland, the main output has been from the famous large low-grade replacement gold-copper deposit of Mount Morgan. Gold-quartz deposits also occur in the State, as at Charters Towers, Cracow and near Brisbane.

MINING

The earliest gold-mining in Australia was by simple panning of surface gravels along the streams. Then the alluvial gravels were mined to shallow depths, from small shafts, the gravels being raised by hand windlass or horse-drawn whim.

The primary ore deposits were first worked by open cut, which gave place to underground methods of working as the ore was followed in depth. As the mines increased in depth, it was necessary to introduce machinery for haulage, and with the greater cost involved larger capacity for production was essential; thus the capital requirements for mining increased. Leases were amalgamated and the private individual, partnership, or syndicate gave place to mining companies. To-day, of course, all but a very small percentage of gold production is obtained by the large mining companies with quite considerable invested capital.

At the present time about 100,000 ounces annually represents by-product gold from Australian base-metal mines—copper, and lead and zinc. The remainder is almost entirely from mines worked as gold mines, the bulk of which is obtained from underground mines, the maximum depth of which, in Western Australia, is close to 4,000 feet. There are a few open-cut low-grade mines, and a small production in Victoria and New South Wales is obtained by dredging alluvium. Small parties still obtain a little gold by sluicing.

TREATMENT

Early mining was of detrital deposits, and extraction of gold required only such simple appliances as the cradle and riffled launder which any untrained labourer could handle. As the primary gold deposits became opened up, crushing by stamp

batteries was introduced to free the gold from its host rock, and the gold was recovered by amalgamation with mercury.

Some ores were not amenable to amalgamation, and for such refractory ores chlorination was used. Probably the Mt. Morgan mine in Queensland was the first mine to introduce such methods, by installing a chlorination plant in 1885.

On the Kalgoorlie field, in Western Australia, the form in which the gold occurred in the oxidized zone led to serious losses of gold in the treatment tailings; the first cyanide plant to reduce these losses was introduced at the Brownhill Mine in 1896. Similar cyanide plants were erected also in Victoria at about the same time. Later, in Kalgoorlie, when the mines reached the sulphide zone, the ores contained associated gold tellurides which were insoluble in cyanide solution; for these ores two methods of treatment were introduced. One method was to dry-crush the ore and drive off the telluride by roasting before amalgamation and cyanidation. The other method, introduced in 1897, was to dissolve the telluride in the crushed ore by means of bromo-cyanide.

The two latter methods of treatment on the Kalgoorlie field persisted until about 1930. At this time the recovery of gold-bearing sulphides and tellurides by flotation was introduced; the flotation concentrate was calcined and cyanided, and the flotation tailings were in general cyanided. Elsewhere in Western Australia, where tellurides do not occur, the ore is generally cyanided after fine-grinding.

REFINING

The bulk of the gold bullion produced in Australia is refined at the branches of the Royal Mint in Perth and Melbourne. In addition, refined gold is obtained as a by-product of lead smelting at Port Pirie, by the Broken Hill Associated Smelters, and of copper refining at Port Kembla, by the Electrolytic Refining & Smelting Co. Messrs. Garrett, Davidson and Matthey, Sydney, also treat bullion and other gold-bearing materials submitted to them.

At the Mints the bullion is melted in a clay pot with a borax cover; a stream of chlorine gas converts most of the impurities in the melt to chlorides which rise to the surface and are removed with the borax. The fine gold is issued as 400-ounce bars of 9,960 fineness, the remaining impurities being mainly silver.

By legislation all gold is purchased at the official price by the Commonwealth Bank, except for small sales made to local industry.

EMPLOYMENT

The accompanying Table shows the number of persons engaged in gold-mining in each State at intervals during the last fifty years. The figures have been compiled from data collected by the State Departments of Mines, and include some prospectors and others who do not work full time on prospecting.

It will be noticed how the employment in gold-mining declined from the peak period of production at the beginning of the century to the nadir of production in 1929, with a recovery in the 'thirties. At the present day, with a higher annual yield per person employed, partly as a result of increased mechanization,

there are fewer men employed in the industry proportionately to production than pre-war. It does not seem likely that the pre-war figures of employment in the gold-mining industry will be equalled in the foreseeable future.

GOLD-MINING: PERSONS EMPLOYED

Year	N.S.W.	Victoria	Queensland	S.A.	W.A.	Tasmania	Northern Territory	Total
1901 ...	12,064	27,387	9,438	* 1,000	19,771	1,112	* 200	70,972
1903 † ...	11,247	25,208	9,229	* 1,000	20,716	973	* 200	68,573
1913 ...	3,570	11,931	3,123	800	13,445	481	175	33,525
1923 ...	1,141	2,982	603	32	5,555	119	30	10,462
1929 ...	684	864	326	58	4,108	63	5	6,108
1933 ...	6,913	6,126	4,161	231	9,900	229	95	27,655
1935 ...	6,652	6,960	3,931	243	14,708	216	403	33,113
1940 ...	2,952	4,783	1,995	157	14,593	123	347	24,950
1943 ...	771	719	1,297	29	5,079	19	40	7,954
1950 ...	715	1,050	1,690	47	7,080	12	208	10,802

* Estimated.

† Year of maximum production for Australia.

TRADE

From 1948 until the end of 1951 exports of gold were small, and during that period practically the entire production was purchased from producers at the fixed official price by the Commonwealth Bank and added to stocks held in Australia.

For some years there had been agitation amongst the producers that they should be permitted to dispose of a proportion of their gold on overseas free markets to take advantage of the higher prices which those markets offered, but such disposal was beyond the terms of Australia's association with the International Monetary Fund. However, on 20th November 1951, the Commonwealth Government with the concurrence of the International Monetary Fund decided to allow producers to sell on overseas markets a proportion of newly mined gold for industrial purposes against United States dollars. In order to give effect to this decision, the Gold Producers' Association Limited was formed, as the selling organization for the industry. Membership of the Association is open to all who carry on mining operations for the purpose of obtaining gold in Australia, Papua or New Guinea. The net proceeds from the premiums are distributed only to members, and proportionately to their production.

In order to maintain all existing provisions of Commonwealth legislation relating to gold, all gold production continues to be sold to the Commonwealth Bank, or as prescribed. Gold which the Gold Producers' Association Ltd. wishes to sell on the overseas free market is sold by the Commonwealth Bank to the Association at the price paid by the Commonwealth Bank when the

gold was delivered to it. The maximum quantity of gold which may be purchased by the Association from the Bank is the amount of gold delivered to the Bank by or on behalf of producers who are members of the Association, less the amount of gold which, according to the Bank, is required for industrial and artistic purposes in Australia, and for Australia's customary but small exports of fabricated gold. Sales have been effected at figures ranging up to 34s. 9d. above the fixed price of £A15 9s. 10d., but in the second quarter of 1952 the premium dropped to a net return of only 10s. to 12s. The gold is sold through brokers in New York and London, to buyers in Paris. Other gold-producing countries are making similar sales, and the fall in the free market price was not unexpected.

It is apparent that Australian gold producers, although they may receive some slight assistance by sales on the free gold market, cannot look to the premium as a means of lifting the industry out of its present almost moribund condition.

CAPITAL INVESTED

It is not now possible to calculate the amount of money invested in gold-mining in Australia since 1851, and of the profits therefrom. Almost all the older companies are long since defunct, and their records lost. In the early days of the industry a comparatively small paid-up capital was necessary to establish a mine. There is some record that between 1870 and 1930 about £5 million was invested as paid-up capital in companies on the Bendigo field. If a mine were of value, the revenue from its early production provided the capital for the plant required. Up to the 1914-18 war, £30 million would have sufficed to develop and equip a very large number of mines. It is likely that the total investment represented by paid-up capital in Australia gold-mining companies over the hundred years has been between £50 million and £75 million.

In 1951 the paid-up capital of Australian gold-mining companies aggregated £11 million, and the total shareholders' funds invested in the industry were £15½-£16 million. Several companies are working long-established mines of which plant and equipment represent many times the value shown in the balance sheets.

There is a tendency to over-estimate the profits earned from gold-mining. The public remembers the spectacular successes and forgets the failures. It is indeed doubtful whether, at any rate in the last fifty years, the total profits from gold-mining companies have exceeded the total capital invested in the industry in that period, when the many failures are taken into account. On the fabulous Bendigo field, for example, only £7 million was returned in dividends between 1870 and 1930 from companies in which £5 million was invested. On the other hand, between 1895 and 1917 Great Boulder Pty. of Western Australia returned nearly £5½ million in dividends on a paid-up capital of £175,000. In 1950 the return from £6 million paid-up capital in twenty-two companies was £1½ million from which £1 million in dividends was paid, or about 16 per cent on paid-up capital.

To-day it is becoming increasingly difficult to raise money for investment in mining. The hazards in mining are great, more so than in any other industry.

The investing public no longer looks upon gold-mining investment as a gamble, but wishes to minimize the risk attached to whatever investments are made. Returns from gold-mining to-day are not compatible with the high risk rate which such investments require.

GENERAL ECONOMIC SIGNIFICANCE

We have traversed very briefly various aspects of the gold industry. We may now well ask, "What has this industry meant in the development of Australia?"

We have seen above the rapid expansion in population which followed the discovery of gold in 1851. This expansion was phenomenal for those times, and was accompanied by an industrial development which would otherwise have been deferred for at least half a century. The rapidly acquired population naturally included many bad elements such as are attracted by the lure of gold, but on the whole they were a hard-working, independent and tough people, ideally suited to settlement in and development of this new country in which living was far from easy in those early days. The wealth from gold-mining, so rapidly acquired, remained largely in the country for development in other directions. Some idea of the remarkable increase in trade which followed the discovery of gold is given by the following: for the five years 1846-1850, the value of exports was £6 12s. 6d. per head per annum; in the years 1851-1855, the value was £18 15s. 4d. per head per annum.

Gold-mining rapidly pushed settlement further inland, and gold-mining townships sprang up in widely separated parts of Australia. In many cases agricultural development was intensified around these settlements, or secondary industries were established within the townships, so that as gold-mining declined in their vicinity these townships continued as thriving centres of rural and industrial activity. The two earliest principal gold-mining centres, Bendigo and Ballarat, are amongst the more important thriving cities of to-day. Many of the coastal ports, particularly along the Queensland coast, such as Townsville, Rockhampton and Maryborough, were established in the first instance to serve gold-mining centres inland from them.

In their search for gold, prospectors discovered other minerals, such as copper, lead and tin, and this led to the more rapid development of the Australian mining industry as a whole. It is of interest to remark that two of our present-day important copper producers, Mount Lyell and Mount Morgan, were worked originally as gold mines.

Western Australia continues to-day to be dependent very largely on the gold industry. Almost the entire inland railway system has been designed to serve the gold-fields centres, and is a factor in pastoral development. If the gold industry were to collapse there would be no economic basis on which these railways could continue to function. For every man employed on the gold mines—in Western Australia nearly 8,000—it is not unlikely that twenty individuals are supported in the chain of supplies and services back to the coast at Perth. The climatic conditions of Western Australia are such that, apart from grazing, little in the way of rural industry has been developed around the gold-field centres. With the decline

of the gold-fields, these centres would almost entirely disappear with resultant serious effects on the economy of the State.

A striking illustration of the effects of gold-mining on development is provided by the gold-fields water supply. The water is drawn from Mundaring reservoir near Perth, and is pumped about 340 miles to Kalgoorlie, supplying also numerous farming districts along the pipe line. The original scheme was completed in 1903, but since then it has been connected to the mines and township of Norseman. In the year 1943-44, 1,368 million gallons were distributed, 70.1 per cent to domestic, agricultural and other users, and 24.5 per cent to the mines.

The Commonwealth Government has long recognized the economic importance of gold production, particularly in the less developed parts of the country. It has already been remarked that in 1925 the industry was freed from tax in the endeavour to attract more capital. This freedom from taxation has been continued to date—one hesitates to picture what would have been the position of the industry to-day had taxation been reimposed, but it may be surmised that production would have been only a fraction of even that at present.

The subsidy paid by the Commonwealth Government to marginal gold mines in 1948 and 1949 before devaluation, certainly kept them open, and assisted in the economic maintenance of certain areas; but such assistance acts only as a temporary crutch. No industry can thrive indefinitely on subsidies. Such methods of assistance may be necessary whilst the price of gold remains fixed at its present level, but the industry cannot regain a healthy vigorousness until there is a pronounced rise in price.

FUTURE

The Australian gold industry, as indeed the gold industry in any country, does not face a bright future so long as the official price of the metal remains fixed at \$35 an ounce. One of the largest gold mines in Australia has recently been placed on a salvage basis prior to closing down. Costs continue to rise and it is not improbable that other mines will be forced to follow suit. The one optimistic note, at the moment, is the commencement of production from a group of mines near Southern Cross in Western Australia.

Gold is the only world commodity the official international price of which has been fixed over such a long period since pre-war. It is also a commodity on which extensive areas of the world are dependent for their economic development. In effect, the development of those areas is being decided, not by the dictates of normal world supply and demand, but by an artificial price, determined for reasons the validity of which may be open to debate, and which, so far as we know, take no account of the development of those regions which are so dependent on gold for their economic life. Because of the restriction which this fixed price has placed on the economic development of large areas in Australia, the Commonwealth Government has, in recent months, strongly and persistently advocated a rise in the official international price of gold.

If the price of gold were raised to a reasonable level, then there is little doubt that the Australian gold industry would show a strongly renewed activity, which

would give a further impetus to the general development of certain regions of the country. There are known deposits which, with a reasonable price for gold, could be brought into production, and exploration of favourable areas would be stimulated. There is still a very large part of Australia awaiting detailed exploration, and he would indeed be a pessimist who does not admit that much yet remains to be found.

DISCUSSION

THE CHAIRMAN: I promised you an entertainment and I think you will agree you have had a good one. We are most grateful to Mr. Rudduck for the way in which he presented Dr. Dunn's paper, and for the trouble he has taken in coming here.

I expect that a number of members in this audience would like to ask Mr. Rudduck questions. There are one or two that occur to me, just to start the ball rolling.

First of all, could he explain to us why it is worth while subsidizing mines. Is it because there is no means of putting the 8,000 miners and the extra 96,000 people indirectly involved in gold mining into other forms of industry? Or is there a hope, which springs eternal in the human breast, so we are told, that the price of gold may become more economic in time? That is the first question I would like to ask.

The next one is, what becomes of the mining towns when the mines cease to be paying and close down? What in fact is done by the Australian Government to deal with the economic distress which presumably must occur? Is there any national assistance, as we have in this country, or is there some other form of caring for that economic distress?

Finally, what is Mr. Rudduck's idea of an economic price for gold?

THE LECTURER: Those are all extremely difficult questions, and they are all related. In the past, when a field gave out, when it became uneconomic at the prevailing price to continue to produce gold in that area, the field was just closed down. If the mine happened to be in an area which had a suitable rainfall and reasonably fertile soil, and was tolerably close to markets, the settlement would no doubt continue to exist, just as Ballarat and Bendigo have continued. There is very little gold-mining there now compared with the amount there used to be, but they have continued to be quite important provincial centres because they are in fairly favourable climatic areas. On the other hand, towns like Kalgoorlie, or Broken Hill—which is not a gold-mining town, but is an important silver and lead mining centre—are in very arid areas, and if the ore ran out, or if it became no longer economic to produce it at the prevailing price, it would present the Government with a very serious problem.

The chairman asked what would be a fair price for gold to-day. I could not say. The prevailing price is slightly over £A15 an ounce. There is a great deal of agitation from countries like South Africa, and from Australia, for an increase in the price of gold. As I mentioned, it has been fixed over a long period; labour costs and production costs have been rising, and the gold-mining companies are not making the profit they used to make. We continue to produce it, I suppose, because it is an important dollar-earner for the sterling area. In fact, if it were not for the returns from the sale of gold the position of the sterling area vis-a-vis the dollar area would be very difficult indeed; it is difficult enough now. So we continue to produce gold, even if it involves some small subsidies. The subsidy is relatively small in the hope that the price will rise to a level where economic production is possible, because the sale of gold is a very important element in the balance of payments of the sterling area.

MR. L. ZUTSHI: May I say that Dr. Dunn has made a very questionable point on this matter of the price of gold. It is becoming more or less an Empire problem; the

whole of the Commonwealth is faced with this very low price of gold. It is not only Australia and South Africa which are suffering from the low gold price, but also Canada, I believe. I do not know if there are any Canadian mining engineers here, or geologists, but I think sixty-four Canadian mines were closed last year when the Canadian Government withdrew some kind of subsidy.

On the other hand, I think this country needs a lot of gold to build up its reserve before it can embark on convertibility of sterling. It is time that Britain, and the whole of the Commonwealth, approached the International Bank to raise the price of gold in relation to dollars and to sterling. The advantage of that would be that the Commonwealth would produce more gold, and we should be able to build up that £2,000 million worth of gold which we need before we can embark upon convertibility.

The second advantage of that would be that many gold-mines and deposits, which are spread all over the Commonwealth, not only in Australia and South Africa and Canada but also in India, which cannot be worked because of the low gold content, would become an economic proposition. Before the war, if my memory is correct, four pennyweight of gold in a ton of ore used to be considered as the economic limit for a workable proposition, and even one pennyweight of gold, found in some places, was considered economic. When the price of gold rose before the war, many poorer propositions became capable of economic development. We will have the same sort of thing happening if we raise the price of gold, which will mean getting America and the International Bank to realize the great necessity for this at least so far as the British Commonwealth is concerned.

What appears to me to be a great pity is that the Conference of Commonwealth Prime Ministers seems to have lost sight of this important point. They have been telling the members of the Commonwealth, for instance Australia, India and Pakistan, to increase the production of wheat. Increasing the production of food is essential, but I think it is equally essential that we produce more gold, because convertibility of sterling is very important. One answer to that would probably be that it takes more trouble to produce the plant and capital required to get gold than to produce a ton of wheat. Of course we need food, and we must produce food, but it is equally necessary that not only should the production of copper, aluminium, zinc and lead be increased, but that of gold as well, and that seems to have been completely ignored.

MR. T. DEWHURST: I wish to support the remarks of the last speaker. It is deplorable that there should be a fixed ceiling price for gold, but no limit, apparently, to the rise in the costs of production. As the gap between price and production costs narrows, more and more of the marginal ore of the reserves is rendered unpayable, resulting in the elimination of millions and millions of tons of gold ore which is unprofitable to mine. It seems wicked that so much gold should be rendered irrecoverable, and particularly so as Gunther in his book *Roosevelt in Retrospect*, 1950, on page 121 states that it makes one shudder to learn of Roosevelt's attitude when he decided in 1933 to raise the price of gold. Indeed, I have read that the price of 35 dollars an ounce was settled at the breakfast table by the toss of a coin. If this story is true, then it is still more wicked that the price decided on should have resulted in so much hardship for the gold-mining industry and the loss of so much gold to the world.

THE CHAIRMAN: I think it would be the wish of the audience that I convey our very warm thanks to Mr. Rudduck for reading the paper, and through Mr. Rudduck to Dr. Dunn for the most interesting address which he compiled.

The vote of thanks was carried with acclamation and the meeting then ended.

THE HIGH PADDINGTON SCHEME

A paper by

SERGEI KADLEIGH, A.R.I.B.A.

*read to the Society on Wednesday, 11th March,
1953, with L. Dudley Stamp, C.B.E., D.Lit., D.Sc.,
Professor of Social Geography, London School of
Economics and Political Science, in the Chair*

THE CHAIRMAN: This country suffers from very many problems at the present time, and it is surprising, I think, how many of those problems stem from one of our initial difficulties, and that is shortage of land. I had occasion recently to try and work out a few figures; and I must say that, finding that the inhabitants of the world as a whole have 14 acres per head of population to play with, I was struck by the position in this country. Even our American cousins are very well off with $12\frac{1}{2}$ acres for every American to play with. Our position here in England and Wales is that we each have considerably less than 1 acre; there is about 0.8 acre per head of population. Now that figure includes land of all sorts, the mountain moorland as well as the fertile plains. And so we have the great difficulty of planning how to use our very limited area of land to the best possible advantage.

In his paper the lecturer will mention the various uses of land which have to be satisfied; and, however deserving are some of the needs of mankind, they do result in the use of what is at present open land. In a way, the needs of industry, housing, recreation, transport, and the fighting services, all result in the spending or using of land otherwise open. On the other side, farming and forestry are saving our open land for us as well as producing our food and raw materials. So the idea gets abroad that there is a conflict. I suggest there is not a conflict, but there is this very urgent need for co-ordinating our uses of land.

It needs vision. It needs men with bold ideas to tackle the problems involved. Thus it gives me particular pleasure to preside here this afternoon, because we are going to have put before us a scheme which is a scheme of great vision. Amongst the audience the lecturer may find that there are those who disagree with him, those who agree heartily with him, and those who would like to but dare not. But I do suggest that at any rate we shall have this afternoon from Mr. Kadleigh, when he talks of "The High Paddington Scheme"—the scheme for the development of a residential area over what is at present used only, I believe, for little trucks to go backwards and forwards for some reasons of their own—an idea which is the idea of a man of vision.

The following paper, illustrated with lantern slides and a large scale model of the scheme, was then read:

THE PAPER

When the *Town and Country Planning Act* was passed in 1947, it was recognized that land use and development should be considered from a national point of view and a legal framework to that end was devised. Thereafter all

development became a matter to be approached solely in the best interests of the nation as a whole. The first practical step was the submission of 153 plans for land use to the Ministry of Housing and Local Government in 1952, and by now most people have a general idea of their nature. To-day we have reached a crossroads: with these plans as a guide the nation must decide in what way it is going to make use of its heritage, the land, in the future. The plans which we do in fact carry out will directly affect not only our own lives but those of succeeding generations. The step taken will be big and irrevocable. We must therefore take full account of the various possibilities known to us and be sure that our choice for practical application will offer the nation the very maximum social and economic benefits from its fundamental resources. This is a question which the nation has to consider now and it is one of very great importance to our future survival and prosperity. We must not therefore fail, through apathy, dislike of change, or fear of regulations, to get a clear appreciation of the nature of the problem and the relevant merits of the different possible means of solving it, otherwise we may well leave a shameful heritage to succeeding generations.

Let us at this point consider again the main factors relating to this complex problem. Thinking now of the basic requirements of the nation from its land: these needs, to quote from Dr. Dudley Stamp in *The Land of Britain* are work, homes, food, and communications (to sustain the standard of life of our great population), recreation (for its health of mind and body), and finally defence (for its security). These needs of course are interdependent and together form an economic whole; the degree to which they are satisfied shows clearly the prosperity, or lack of it, in any nation. If we take each of these needs in turn we shall then see the main factors of our problem.

First, then, let us consider the need for work. Before our industrial age, work consisted in the main of employment on the land, but now, for the majority of people, it consists of employment in industries located in our towns and cities. A rapidly increasing population and the extraordinary development of science and technology have together resulted in the formation and growth of our towns as we see them to-day. We are the most thickly populated industrial nation in the world with a far greater proportion of our citizens living and working in towns than in any other country. Although our towns have in a sense grown to their present ungainly size by accident, yet they might be said to have followed a general broad pattern: the choice of an area to establish some basic industry, with a resultant random growth of homes for its labour; the formation of supporting industries in the vicinity; the further prosperity of such a growing town; its magnetic attraction of more inhabitants, with consequent expansion of employment and communications, and further facilities for education, and professional and medical services. Saturation is soon reached in a town or city whose magnetic attraction is far in excess of its physical capacities, and thus we have the tight congested knots of our big cities to-day.

If we take a simple analogy of applying heat to water, we may perhaps see more clearly how our cities could be adapted naturally to cater for the present

situation. When water in a vessel is heated it gradually reaches boiling point but does not get hotter; instead it stores up latent heat for a period, then transforms to steam; in other words it changes the shape of its constituent elements to cater for a situation rendered intolerable.

Let us think of our cities as the water in the vessel, their populations by their activity producing the heat, and, corresponding to hydrogen and oxygen in water, their buildings forming their constituent elements. If the magnetism of the city through its prosperity continues to attract the population, the city becomes saturated but still the population flows in. The situation becomes intolerable and something must inevitably happen. More water can be added up to a certain point until the vessel can hold no more, beyond that the water must turn to steam, that is, change its structure. Similarly, the land cannot economically hold any more of the horizontal development we are used to, so we must change the structure and develop vertically but in complete units which comprise all the elements of a town.

Make no mistake, the magnetism of our big cities is not a small matter which can be dealt with by decanting populations to local areas. This magnetism is now so great that it has become inseparable from the very standing that our country enjoys among the nations of the world and the increasing growth of industry everywhere. This we cannot alter, it is on the scale of history, but it does lie in our power to adapt our cities to this phenomenon in as human and realistic a way as possible. As it stands, our cities are rapidly becoming incapable of dealing with the congestion resulting from the thousands of people attracted by the best opportunities for employment, professional and business advancement, health services, and such facilities that only the prosperity of our cities can offer, and are adopting the desperate remedy of trying to force their populations back on to the immediate countryside around them.

Our nation however relies on the efficient production from her cities of the goods with which to buy more than half the food requirements of her population in world markets. Thus from the point of view of the nation's industrial economy, the requirement is for the utmost concentration of industrial productivity in her cities, as this has the advantage of the greatest economy in the basic relationship of industry, labour, and transport. But this must be achieved in a way which does not cause ill-health to the population and loss of time, efficiency, and energy, through traffic congestion and unduly long journeys to work, shopping, and recreation.

Next comes the question of homes. With the great increase of population and the devastation caused by the war, the homes in which many of our people are obliged to live make the question of housing great numbers of our population one of the utmost gravity and importance. The scale on which our new homes are required is that of whole towns which are integrated communities, a scale which affects all the other aspects of our life. Basically, the requirements are a sufficiency of rooms to prevent overcrowding, planned as individual homes of a variety of sizes to cater for large families and for people living alone, in a form which can easily be managed, and grouped in such a way as to provide light,

fresh air, privacy, and the benefits associated with private gardens. Furthermore, the homes should be so sited as to afford the most direct and easy access to work and shopping on the one hand, and recreation centres, open spaces, parks, playing fields, and the open country on the other.

The question of food is, of course, fundamental. The magnitude of the world's population is such that authorities most competent to judge gravely doubt whether the world's food resources will soon be able to support its population. It is evident that if the world food markets are highly competitive now they are likely to become progressively more so; it is prudent, then, that a nation like ours, which has to import so much of its food, should consider it essential to grow as much as possible in order to survive in the critical days ahead—bearing in mind that the agriculture of these islands is not only a source of food, but is in many ways also a valuable source of exports. This, we all know, is accepted policy, and therefore from the national point of view it is clear that no more food-producing land should be taken, unless this has to be done for a purpose more important to the nation than its supply of food.

Land must necessarily also be used for communication. We have built up in this country, due to our past wealth and industry, an incomparable network of communications binding the general pattern of land use. This network however, though comprehensive in extent, needs to be brought up to date in many respects. One of the characteristic features of the congestion of our cities is that our communications are greatly over-burdened. From the national point of view it seems that we should improve our existing communications and, through the re-organization of our cities, considerably lighten their load and provide for new developments.

Recreation is a further basic need. The greatest source of recreation the nation possesses is its countryside and it is therefore important for us to preserve its unique beauty and attraction both by improving its cultivation and providing inducements, comparable to those existing in cities, to stimulate agricultural employment, and, also, by keeping our cities within their bounds, so that city dwellers can easily reach and enjoy the pleasures of the countryside. Furthermore, it can be accepted as essential for the well-being of our nation that adequate playing fields are at hand for all sections of the community.

Finally it is important to consider strategic defence in developing our towns. Naturally our Services require special areas for training and the maintenance of their establishments at a strength and pitch of efficiency to ensure security. The considerations of defence also play an important part in the deployment of our industries and towns; from this point of view, although industry is inseparable from the town around it, which is its source of labour and transport, yet the disadvantages of such density of population as for instance is found in London, would diminish if, to quote from the Barlow Report, "population were dispersed into properly planned smaller centres separated from one another by belts of open country".

These then, we may say, are the basic national and human needs for which

we must use our land to best advantage. This is the theory of what we want—now we must put it into practice. Like all attempts to bridge the gap between theory and practice we must first start from the facts of the existing situation, and firmly put aside utopian dreams of some future civilization or state, and equally theoretical speculations such as how much room the whole of our population would occupy if every one were housed in this way or in that. The facts of the situation which exists in each area of our land must be studied and from that basis, bit by bit, we can redevelop towards the fullest practical realization of the nation's basic needs. To enable this to be done and the gap between the theory of what we want and the fact of what exists to be bridged in practice, we must first decide on the right scale from which to approach the problem practically, then determine what such a scale might mean to the whole, and finally discover the possible forms related to that scale.

It is important to use the right scale in considering this national problem, as, if we do so on too big a scale, our solution is likely to be impracticable and, if on too small a one, we shall not be able to see the real difficulties. Let us take the old maxim of "thinking two down", which has proved itself in practice on countless occasions. We must think therefore on the scale of a neighbourhood unit, that is of a complete community of some 10,000 people. This scale seems appropriate too if one considers that the problem of housing the many thousands of homeless in our towns and boroughs is incommensurate with the idea of one family or one house, but can reasonably be considered in terms of a group of families or houses, that is a neighbourhood, and one of about 10,000 people has been shown by analysis to be the economic size, indicated in the recommendations made in the Greater London Plan.

The next stage, that of formulating some clear conception of what such a community could mean, is necessary, as otherwise we shall have no point of view from which to assess the merits of what exists or to consider the possibilities of what might be achieved. Such a community one could perhaps think of as being the smallest organization which can economically contain all the ingredients, characteristics, and qualities of a town; these are officially quoted as "residential area, central area, industrial area, educational area, open land, and large establishments". Such a community could be expected to have its own individual character and civic pride and, if healthy and prosperous, contribute directly to the well-being and prosperity of the nation. This principle has in part already been recognized and the pattern of such existing neighbourhoods has been traced and defined in our towns; furthermore, it has been recognized that development by such communities should be undertaken.

Finally, before considering in detail a particular area, we must realize that we shall be looking at an existing use of land from the point of view of the different physical forms that such communities could take in practice; in other words, we cannot begin without some idea of what architecture, engineering, building, and agriculture have produced in the past and are capable of producing at present and possibly even in the future. The plans for urban development already submitted have obviously been considered from the point of view of the various

combinations of industrial and public buildings, homes, gardens, shops, and so forth, in the familiar horizontal form of development. We have now, however, with the idea of "High Paddington" the added possibility of providing the same repertoire in a vertical form of development.

Now we are ready to apply the idea on a practical scale to an existing set of conditions, namely, to one of the most congested boroughs of London, typical of the present state of our towns where the need for re-development is the most urgent—the Borough of Paddington.

This area, some 1,357 acres, is thickly populated and densely built over. The buildings, many of them derelict through lack of maintenance, are so overcrowded that the waiting list for homes is in the region of 4,000 families. As for open spaces and playing fields, including private gardens, there are only 132 acres to cater for a population of some 130,600 people. It is clear that this area is badly in need of re-development, the most urgent aspects of which are obviously to provide new homes in place of the existing overcrowded slums, and major open spaces and playing fields which are so sadly lacking at present. In addition, we must do everything possible to ease the burden on communications by reducing the necessity for constant travel to and fro, and strive towards a better deployment in this vulnerable area for defence purposes.

First let us consider what it is possible to achieve in this direction with the familiar horizontal forms of development. The choice of sites is severely restricted because to clear existing slums in order to rebuild means displacing and rendering homeless many hundreds of families now living in them. The difficulty and expense of providing alternative accommodation for such displaced families have already proved to be almost insuperable obstacles. In fact we have it on the authority of the Chairman of the Borough's Housing Committee that apart from 2,500 families at present housed in requisitioned premises, the very maximum that horizontal development can offer, including high density blocks of flats to the maximum permitted heights, is a further 430 flats added to the 530 now under construction, after which there will be no more possible sites left in the borough. This means that about 3,000 families will have to be provided with homes and work in one of the new towns or in a new suburb. The amount of land taken up by a slice of a new town represented by a population of some 3,000 families is about 1,000 acres—almost inevitably good agricultural land.

This solution from the national point of view would provide homes and possibly work in a new town or suburb. But in doing so it would reduce the nation's basic food and recreation resources by some 1,000 acres, it would indirectly place an extra burden on industry to make good this loss of food with additional exports, it would not in any way relieve the time spent in daily travelling and hence the burden on communications, nor would it provide the open spaces and playing fields so badly needed in the borough, or clear the slums; and, finally, Paddington would remain as vulnerable from the point of view of defence as before. It would seem that this is a very expensive solution even for

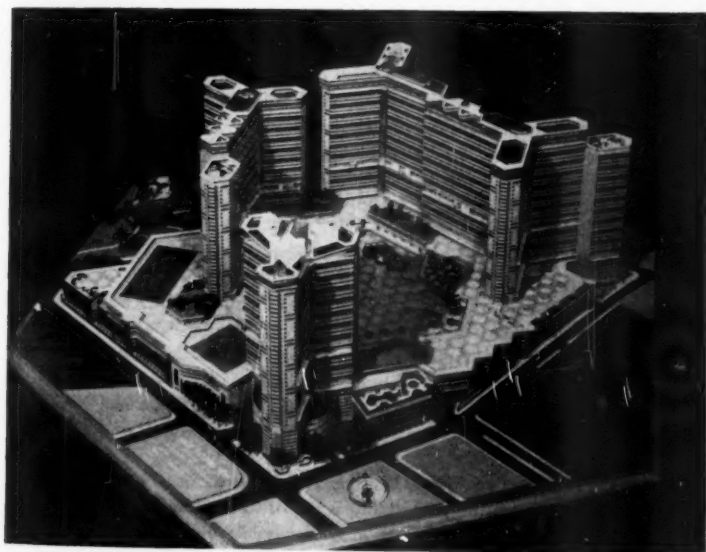
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THE HIGH PADDINGTON SCHEME

a prosperous nation, but for us as we are, we can surely only contemplate putting such a scheme into practice if we are convinced that there is no possible alternative.

Now let us turn to what the "High Paddington" form of development has to offer in the same circumstances. First, by making full use of modern building technique the same area of land can now be used for more than one purpose in urban development, so our choice of sites is not so restricted and we can look for suitable places to develop in areas denied to horizontal development. We at once see that "High Paddington" could be built over the 20 acres of goods yard by Paddington Railway Station, virtually without displacing a single family. On this one site alone we can therefore house a complete community of some 8,000 people which would provide homes and work for the bulk of the borough's waiting list of families. Once built, "High Paddington" can rehouse the people living in the overcrowded and often derelict buildings around it, these can then be demolished and a 100 acre park provided in their stead, thus giving the citizens of Paddington open space and playing fields—a considerable amenity to Paddington and an asset to London.

"High Paddington" should not, of course, be confused with a block of flats. It is conceived on entirely different principles, as though it were a hill town complete with all the social and economic requirements of a prosperous community of 8,000 people, gaining the sweeping views, clearer air, noble



[Photograph of "High Paddington" by courtesy of the Architect and Building News

skies, spacious promenades, and intimate gardens that one associates with the delights of living in high places. Its industry and commerce, placed astride road, rail, and canal transport in the heart of London and within walking distance of its source of labour, have all the material conditions for a prosperous community. The residential area situated in the cleaner air and light above the noise, smoke, and fog of London, with its variety of dwellings for every size of family each with private gardens, its numerous playgrounds for children of all ages, and its church, schools, clubroom accommodation (if required by the inhabitants), laundries, libraries, and workshops, has the material requirements for healthy family life. The town centre consisting of 18 acres of open pleasure grounds with its public gardens, fountains, shops, restaurants, cinema, and amenities, all completely segregated from traffic, has the requirements for real sociability and the pleasure of meeting friends and acquaintances in spacious surroundings. The park and playing fields surrounding the whole bring outdoor activities within immediate reach, and, combining with the sun, help to produce in the air around "High Paddington" the properties associated with health and well-being.

It has been the aim to combine these aspects of the town in such a form that, to quote the official expressions used in *The Density of Residential Areas*, the desire for "ample dwellings, spacious surroundings, and plenty of room close at hand for outdoor activities" does not conflict with "convenience, accessibility and sociability". All the essential elements of the town are so accessible to one another that time and nervous energy wasted in daily travelling can be greatly reduced; moreover, the housing of such a considerable community in the area of their choice might well indirectly contribute to easing the burden on communications generally.

Finally, from the point of view of defence, "High Paddington" provides its inhabitants with an excellent deep shelter connected with the London Underground Railway system, which is accessible to all in whatever part of the structure they may happen to be; furthermore, as a way of developing, it is in keeping with the strategic recommendation for smaller centres separated from one another by belts of open country.

This alternative way of developing seems, from the national point of view, to offer far more than the previous remedy of horizontal development. Not only are the people housed where they already have employment, but slums are cleared, Paddington stands to gain a new park and playing fields, the burden of travelling is eased, the borough has greater protection and is better planned for strategic defence; and, with all these benefits, the nation has not been called upon to sacrifice a single acre of her basic food and recreational resources. Surely this is a far more economic way of using our limited assets.

Although the project of "High Paddington" is on so small a scale, such an experiment is long overdue, and should it prove to be desirable to develop in this way, the advantages to the nation as a whole would seem considerable. The question is can we do it? Technically we know that there is nothing

particularly difficult in building such a town with modern materials and technique. In America buildings twice as high have been built successfully and have become a familiar feature of the landscape. In France a similar experiment has been achieved with outstanding success by the great French architect who has recently been awarded the highest architectural honours both by his own country and by ours. But can we do it financially, and can our building industry cater for such a type of development?

Financially it seems more the question of whether we can afford not to develop in this way. What we can afford depends on how prosperous we are; during the industrial revolution and up to the First World War we were a creditor nation and could afford to develop our towns in the indiscriminate way we did. The gross extravagance of national resources inherent in such development, waste in land, health, transport, and engineering, were hidden by the nation's prosperity. Now that we are no longer prosperous and have become a debtor nation, we are made acutely aware that we can no longer afford such extravagance. We were pioneers originally in developing our industries and advancing science and technology; we must now be pioneers of the next stage, that is in devising a way to live with this industry. The growth of industry has had in its wake the haphazard creation around it of all the attributes to living, which we generally term a town; now we must discover a way of reversing the process and, by reshaping the town, encourage its industry. In terms of actual money, this form of development would not require a permanent government subsidy as it provides its own means for reducing rents in the residential area. Yearly revenue from the two million square feet of valuable industrial and commercial property could subsidize the remainder to the extent of some five per cent of the capital cost annually; thus permitting the economic rent for a three-bedroom apartment to be as low as thirty shillings per week exclusive, and still showing a reasonable annual return for capital spent. This means that such a form of development could pay its way.

Let us now consider the question of the building industry, its capacity to build in this way, and whether it can do it economically. It seems to me that our scientists, engineers and technicians, are fully able to devise methods for the greatest economy in time, labour and materials, for any given problem. Indeed it appears to be a characteristic of our times to be able to devise rapidly and skilfully methods and materials for carrying out whatever is wanted. Already a very big step in co-ordinating the building industry on a commensurate scale for economy has been made with the formation of the Modular Society, which was inaugurated in this very room quite recently. No, the difficulty is not whether our building industry can adapt itself to different methods, the difficulty is in presenting definite requirements to the industry. If as a nation we can offer little for the building industry to aspire to, it is obvious that it will become progressively more stagnant. The industry is geared to whatever is in fact demanded of it; if we ask it to build up and not out, I am quite confident that it will prove itself highly skilful in building up. The industry wants a lead, and not a brake, like all of us.

So far I have discussed purely the material and economic aspects of "High Paddington", nothing has been said of its architecture; needless to say at this stage it has not been studied in any detail beyond a simple statement of principle.

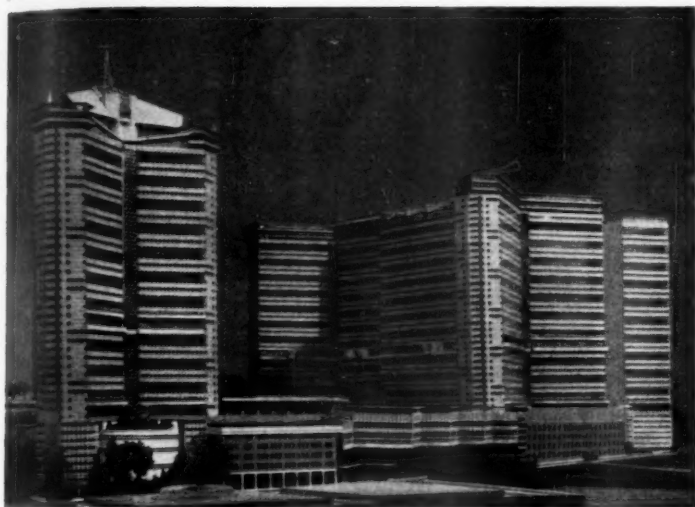
It is strange how almost every building erected prior to, say, a hundred and fifty years ago is by common consent regarded as an architectural masterpiece which must be preserved at all costs as it is considered that nothing we are able to accomplish to-day in this art can possibly equal it. The bulk of people view with regret the passing of any historic building as being the disappearance of a work of art impossible to replace. Architects themselves seem to prefer to live in as perfect examples of the buildings of the past as they can afford. All this seems to indicate that some intangible quality which was present in the past has been lost and not replaced. Some people say that civic design has been forgotten, others say that modern technique has not yet produced a satisfactory architecture, yet others deplore the lack of humanity in modern buildings. There are probably as many formulations for what is lacking as there were people who are interested enough to think about it. The one common factor in all these formulations, whether by architect or layman, is that some quality is missing in building and this quality they are unanimous in associating with the word art.

So we have, it seems, a general body of opinion which agrees that the buildings which have been preserved from the past have this quality while the buildings of to-day have it not. We look around and see so many new materials and so many new techniques being used in buildings, yet we have a suspicion that the resulting contribution to the art of the world is very small. Let us look back and see if we can discover what has altered.

The most obvious change is in the field of science and technology. Through the incredible developments in this field, the material side of life and methods of construction have changed. But ways of life have changed many times in the past and methods of building have altered very drastically also, yet each civilization has produced some examples of building, which by unanimous agreement have been associated with the word art.

In the field of philosophy perhaps there has been an even bigger change. Older philosophies before our industrial age treated the universe as a created whole in which everything including man was related through order and meaning, which ideas found expression through proportion and symmetry in the works of art handed down to us through the centuries. Our modern industrial age however produced its own popular philosophy which denied all meaning to proportion and the existence of symmetry. Now this was a unique break in the history of our civilization since its dawn in Greece and suggests a possible explanation for the absence of art from our architecture.

Due to this denial of meaning by which the quality of architecture could be valued, we are now driven to assess quality by quantity; the size of a building has in some extraordinary way become associated in people's minds with its quality. To an industrialist or business man, the size of his factory or the size of his office has become associated with the quality of his product, or scope of



Photograph of "High Paddington" by courtesy of the Architect and Building News

his transactions—the bigger the factory the better the product, the bigger the office the better the business. On the other hand, size has become associated inversely with the human qualities, and assertions are made that if a building is big, it is therefore inhuman, ugly and out of scale; and even stranger assertions are made that no building can be human or beautiful if it is either bigger or smaller, or in any way different from its surrounding buildings: this is known popularly as being in keeping with its surroundings, and a praiseworthy aim.

It might perhaps be said that whatever it is necessary for man to build need not be inhuman or ugly or out of keeping with its natural surroundings, provided the laws of proportion and symmetry are mastered and applied. Therefore in considering the architecture of "High Paddington", I can only say that when the time comes the quality of art will be present or absent to the extent of the architect's understanding of the laws of proportion and his ability to apply the technique and discipline of symmetry. Whether one measures the result in terms of the presence or absence of civic design, the presence or absence of the human scale, the existence or otherwise of harmony or rhythm, or in whatever other terms people may wish to describe it, in reality it seems to me it will imply the exact measure of understanding of these two ideas used with whatever talent has been given to the architect.

Like any other idea "High Paddington" can only be proved by practice; theoretically it seems to offer advantages to the nation, both socially and economically. Technically and practically we know it can be built, but only by

living there can all its advantages be known and enjoyed. This principle seems perhaps a little unusual, but if one considers that the usual and well-known methods do not serve the purpose, a method which does so cannot be the same, and must, by that very reason, appear unfamiliar and perhaps a little startling. May I finish by quoting the words of the present Minister of Housing and Local Government spoken at the Royal Institute of British Architects; when stressing the desperate need for houses, he said "I shall look confidently to you (architects) to be the pioneers in offering no resistance to any method, any novelty, however new and startling, which may look to promise success, so long as you can combine productivity with good design".

DISCUSSION

SIR GEORGE L. PEPLER, C.B., P.P.T.P.I.: I think in looking at these things one has to consider their total effect. One cannot examine this project by itself. One has to examine particularly, I think, the relationship between the vertical transport on which this project depends and the horizontal transport with which it will have to connect. If you have this great amount of vertical transport, you will obviously have to have space on the ground for the relationship, because whatever goes up and down has also to go horizontally.

With regard to that also, it will have an effect not merely on the immediate surrounding, but on the traffic coming from a wider area; because, as I understand this project, it is to be self-contained and therefore there will obviously be a great deal of interchange between commerce and industry that will be attracted to the building.

The thing that frightens me, quite frankly, about the scheme is this entire reliance on mechanical transport. You are going to have 8,000 people in these great high blocks entirely dependent on mechanical transport. I happen to live in a very pleasant flat; my wife and I chose to live on the third floor because lifts do have to be . . . overhauled, shall I say, and on the third floor or even the fourth floor you can walk it. Recently during the floods we had to walk, and we did not mind. But if I were on the thirtieth floor, I think it would be rather a terrifying experience. The idea of this great block relying entirely on mechanical means of transport is rather a frightening thought.

I should like to ask about this garden space. I think the book says it is 325 square feet per dwelling, and I understand it is divided between the back and the front. The lecturer spoke of children playing in one of the gardens, and it struck me that if you split 325 square feet you do not have very much space.

Now I do not know if the lecturer has been to New York. I have not been since the war, but I do know (though it does not relate to this type of building) that they had found quite definitely that the Empire State Building, for example, was never more than a third occupied. What they were finding was—I do not know how it works out in proportion here—that as you go up, so you have to increase your elevator space, and that does occupy a considerable space, and is very expensive to run. That is a factor that has to be taken into account. All my "city planning" friends in New York constantly warned me, too, of the frightful road traffic jams you get with these high buildings.

There is one last point on which the lecturer may perhaps be able to help me. As I understand it, the scheme is that by this great vertical block you release a great deal of land, which is turned into parks and used for schools and so on, linking up with Hyde Park, which is a very attractive idea. But I think if you take all that land and relate it to the population, it works out at something like fifty persons per acre; so that in fact you would not be saving agricultural land if this type of development

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were universally adopted, because I think you will find that is about the average town density. That is merely a point in relation to agriculture.

With regard to the project itself in Paddington, as I say, my doubt about it—it is more than a doubt really—is that you have a congregation of so many people vertically, entirely dependent on mechanical means of transport, for example for getting down to the playground space that would be required in relation to the population. I do not myself think that it would be a good plan to put families with children there. But I have very much enjoyed hearing the lecture.

THE LECTURER: Let me take the question of dependence on lifts to begin with. It seems to me that one is always dependent on mechanical transport, whether horizontal or vertical. In one case you are dependent on it to get to the ground; in the other case you are dependent on it to get to your work, to your shopping and all the rest of it.

SIR GEORGE PEPLER: But you have alternatives horizontally.

THE LECTURER: Well, you have the alternative of walking. I think the average time spent in daily travelling to work is somewhere around an hour and a half, or an hour. You have the alternative of walking an hour's mechanical travel distance, or walking twenty flights, if you like to put it that way.

As to garden space, you say that there is insufficient space for the garden to be a real garden. I agree, it is not meant to be a real garden. It is meant to be enough space for the children to be out in safety in the fresh air, and under the supervision of their mothers who are cooking or working in the house; a sufficient area to allow two or possibly three children to play in comfort and safety. The area, when divided by two, gives you a strip of about twenty feet wide by eight feet deep in the case of the front garden and by ten feet deep in the case of the back garden. Now, if you take the front garden as being the show garden, where the mother and father can sit and trim and enjoy their flowers, that need only have a pram in it. The back garden is to provide for children playing; I feel that children rather gravitate to one corner: they seem to like going to a small place and getting to know it very intimately; they have their favourite place to play in. So I would suggest that an area twenty feet wide by ten feet deep is enough for children who require direct supervision to play in comfort. For children who do not require direct supervision, there is, after all, within five minutes' distance from them, eighteen acres of open space, with playgrounds, gardens, and all facilities, and not a trace of motor traffic. They can also get to the park around it without having to cross a single road. Therefore you can provide every type of playground for children of all ages. I submit that that is as reasonable a way of tackling the problem of children living high up as any answer to the problem of the child in a horizontal type of development which both plays in its back garden and strays across the road.

With regard to the comment that this in fact would not save agricultural land because if you did clear the area round it the density would be in the region of fifty persons to the acre, that is roughly right. But it must be remembered that it is an overall density including industry, playing-fields, and everything else. Therefore, if you compare the existing overall density in London with a theoretical overall density of fifty persons an acre, you stand to save a great deal of agricultural land.

THE CHAIRMAN: I see in the audience a great expert on interior planning, Miss Denby.

MISS ELIZABETH DENBY, HON.A.R.I.B.A.: I want to say that I warmly welcome this admirable plan. I have not had the advantage of seeing it in detail; but the thought of a comprehensive re-development of an area like Paddington, which I know very well indeed, bearing the needs of all humanity in mind, seems to me something we should strain every nerve to try out, not merely for other areas in London, but for the

areas of central Leeds, Manchester, and all the other towns which are at present plotting their overspill, not only into their own agricultural area but into areas in the adjoining counties. I do not know, Dr. Stamp, if I am right to say this, but I do look on this problem of overspill as one of the most urgent problems with which we ought to be dealing at present. I feel that no overspill should be permitted from any city or town until every alternative method of re-housing people has been explored. That is why I welcome a project such as we have listened to to-day, although I have no doubt it would need amending in detail, perhaps even in some of its fundamental aspects. But in general I think it is so imaginative, so lively, so—if I may say so—so *young*, that I feel we ought really to be giving it every attention we can, and to be helping it forward. I have enjoyed this afternoon immensely.

MR. H. ALEXANDER FURNESS, L.R.I.B.A., A.M.I.M.E.: Mr. Kadleigh had one slight dig at architects preferring to live in the best old houses they could afford. I find that almost invariably the advocates of high density building themselves prefer to live in houses; and unless he has very recently removed, Mr. Kadleigh himself, I believe, lives in a three-storey house and not in a huge block of flats as one would presume.

My other comment is that I think the lecturer's photographs of Hitchin and Stevenage were a little unfair. After all, they did represent what, as anyone who lives in the country knows, is not a fog at all; it is a rural mist, which is quite a different thing from the London fog.

THE LECTURER: That is quite right. I do live in a three-storey house. And the photographs of Hitchin and Stevenage might be called, in that sense, I suppose, unfair. But they are extremely expressive of what I meant to convey, which was that if you do go high, you get into clearer air.

May I take this opportunity of saying one thing. Please do not think that this is anything to do with anybody's utopian idea of how anybody should live; it has nothing to do with that whatsoever. This is to do with the hard practical fact of where we have found ourselves at the present moment and how on earth we are going to make the best of it.

MR. M. C. HOLLIS, M.P.: What degree of consultation has there been with the Paddington housing authorities? Have they expressed any opinion about this plan?

THE LECTURER: From the very beginning of working out this project, the leader of Paddington Council and the Chairman of the Paddington Housing Committee, in their private capacity, have been in close consultation with my office and myself; also the Member for South Paddington, who wrote the foreword to the published book.

BRIGADIER J. L. P. MACNAIR: I was at a meeting last night at the Institute of Mechanical Engineers, where we were discussing the question of engineering changes, more from the technical aspect of how to run an engineering factory than from the general way in which we should approach this problem. Nevertheless, in some ways it is a very similar sort of problem. The engineering industry is faced from time to time with the necessity for making changes, for example in certain aspects of the design of a motor car. It is a very small thing compared with the design of a town, yet it has similar characteristics. One thing which was brought out very clearly was that no reputable engineering firm would sanction any change, however small or however great, unless it could be very clearly shown that it would be an advantage. You see, sometimes firms run into the most awful problems. They get a part which does not function as it should, and everything seems to be coming to a standstill. There are conferences and discussions and plans, and there is a tendency, a panic tendency, to say, "For goodness' sake let's try this idea, it looks all right, let's see if it works, because no one can think of anything better". That is an absolutely fatal way of approaching any problem.

Well, this problem Mr. Kadleigh has produced is a very fundamental one, and I feel that a meeting such as this is of the very greatest value, because it gives us that approach which the engineering world takes to any fundamental change in design. We have heard a number of views, some of which are critical, and it is up to us to meet those criticisms in an intelligent and satisfactory way. I feel sure that Mr. Kadleigh has in point of fact met a good many of them extremely well, and that this discussion is going to be of very great value in furthering a project which I myself feel should quite definitely be undertaken.

There is one point which I do not think the lecturer made very clear. He said that this is an integrated town including not only living accommodation, shops, and recreation facilities, but also industry. It is not clear from the plans we have seen where the industry is intended to go. I should like to ask Mr. Kadleigh if he would tell us a little more about that.

One criticism was brought out in relation to the experience in New York with very high buildings like the Empire State Building which are not fully occupied and not altogether satisfactory. I think the reason is that those high New York buildings were planned with a very limited objective, and they are not truly integrated in the way that Mr. Kadleigh's plans are intended to be integrated; therefore these buildings are not serving a really satisfactory purpose. They were built primarily with the object of getting as many offices and apartments as possible into occupation, but with no further thought. Now this new scheme is obviously bringing in a very great deal of further thought; and the result, I hope very sincerely, will be successful.

THE LECTURER: Thank you, Sir. You asked where the industry went and how it fitted in. I could not show all the drawings of the scheme this afternoon, it would have had to be a different kind of talk. But, in principle, you get a road, rail and canal terminus in the middle, with industry on different levels around it. I could explain more clearly on the model.

MR. BRYAN ANSTHEY, B.SC., F.R.I.C.S.: We have been listening to a fine exposition of a fine scheme, and I hope I shall live to see it in practice; it seems to me that one of the tragedies of this country is that ideas which were promulgated about fifty years ago and were applicable about twenty-five years ago tend to get put into practice to-day. Of nothing is this more true than of the so-called "garden city" movement. Fifty years ago or thereabouts, when Ebenezer Howard was putting forward his ideas, they were beginning to be applicable to this country; and twenty-five years ago, or in the period immediately following the 1914-18 war, they were highly applicable. But they were not applied. Now some people are trying to apply them to-day, when they are no longer applicable.

This scheme is applicable to our situation to-day. It is, as Mr. Kadleigh has said, thoroughly realistic in the present situation. I hope we shall see it put into practice quickly, because it may not be applicable fifty years ahead, which is about the time it generally takes for ideas to get put into practice in this country.

I should like to make another point which I think is highly relevant, arising out of the question of fog and the question of transport. As to this business of transport, you have got to get, not only to your work, but also from the bus stop—if you are a person who uses public transport—to your house; and anybody who lives on a new housing estate knows that this can often itself be a walk of a mile; sometimes in built-up suburban areas, where development has been there for twenty years, it is still a mile to your nearest bus stop. That is quite as difficult as walking up ten or fifteen storeys . . . Well, it depends a bit on your age, I agree. But it is certainly more difficult to do it in the fog than to walk down twenty storeys in a lighted building.

The key point to the understanding of this is, I think, the fact that you are dealing in cubic space and not, as my friend Goldfinger and I have often said in this sort of gathering, being a "scum planner": that is to say, not trying to cover the earth,

which ought to be used for growing things, with a scum of bricks and mortar, but going up into higher space in order to use that space, which we are not doing if we keep on the ground. That is, I think, highly relevant to the value of the scheme. What you are doing is to take into your assets a huge volume of space which otherwise is not being used by human creatures but only by the insects above you.

Lastly, the two types of scheme have already been tried out in prototype by private enterprise before the war. For example, you have a hundred acres of land which used to be Handley Page's Aerodrome, on the outskirts of Golders Green. This was developed very carefully by a good developer on the best garden city principles, approximately twelve houses to the acre. Thereon were built approximately 1,200 dwellings: average number of persons 3.5 (we have had 0.5 of a person before!), so giving you approximately 4,000 people in that area, on one hundred acres. In Dolphin Square on the Embankment you had approximately ten acres with about 1,200 dwelling units, flats of various sorts, and some shops, a swimming bath, and, I believe, squash courts, and so on; this sort of scheme in miniature. It was developed by private enterprise also. I know from personal experience to which centre people preferred to go; it is clear from the fact that at one centre they would pay higher rents than at the other. It was Dolphin Square, with all the difficulties that have been stressed, including walking up and down stairs if the lifts break down. In fact, they do occasionally, but people are quite willing to live on the eighth floor, which is a sizeable walk, and take the risk of the lift breaking down. So it has been demonstrated that it can be done. In Dolphin Square only ten acres were used, instead of a hundred acres. Supposing you had taken the Golders Green Estate and, instead of putting up your 1,200 houses, you had put up two blocks of Dolphin Square, each would have been surrounded by fifty acres of open space, and you would have got double the density and taken up no more land.

THE HON. R. A. MCMULLEN (Agent-General for Alberta): British industry in post-war years has been successfully selling elevators in Canada from the Atlantic to the Pacific, the contention being that Britain makes the finest elevators in the world. Now, quite frankly, I am beginning to doubt that that is so, because I find that on every side people wonder whether elevators will, in fact, break down. I have been travelling in lifts and elevators in the tallest buildings in the United States, in this country and in various other parts of the world; and I have never yet had an elevator or lift let me down. But I *have* been let down by a bus!

MR. OVE ARUP, C.B.E., B.SC., M.I.C.E.: We have long been trying to solve our housing problem by spreading further and further out in the country-side, in the suburbs, and so on, and we know it is unsatisfactory, for all the reasons which have been given. We have also tried to build up blocks of flats; and it seems to me that most of them bring the disadvantages of living closely together in small boxes, without any of the advantages, which are, surely, all the social amenities and all the amenities for the housewife that can be obtained from that form of living. But we have really never tried to do what Mr. Kadleigh is proposing to do in High Paddington. It has often been talked about, and I think it ought to be tried at least once, because all the other solutions are in fact unsatisfactory. We can not perhaps quite know whether it is satisfactory or not before we have tried it; but there is certainly every reason to try it if it can at all be done.

THE HON. PHILIP SAMUEL: The last speaker mentioned the question of amenities for the housewife. As I understand it, this scheme is to house a cross-section of the community at present in Paddington, which contains a very large number of old and physically handicapped people. I should like to know whether the scheme has sufficient advantages for them, over and above the present situation.

THE LECTURER: The type of accommodation envisaged is extremely flexible.

I think the size of the scheme warrants and can cater for particular kinds of people, disabled or very old, and so on. The important thing is that the size of the project is so great that a slight variation here or there is swallowed up in the general whole; whereas on the ordinary size of estate variations have to be very carefully considered because they have a big effect on the cost. But that is a very important point, and I think it could be quite satisfactorily allowed for.

MR. E. MUNRO RUNTZ, F.R.I.C.S. (Chairman of Council of the Society): May I assure Mr. Kadleigh that I am one of those strongly in favour of building higher in suitable places in London and other cities. But I should like to ask one or two questions which have occurred to me. Can the lecturer tell us what the estimated cost per cubic foot of the proposed building is likely to be? How hard will it be to persuade the London County Council to alter their fire regulations? How will the existing sewage system of Paddington react to such a large concentration of population? And will very heavy alterations be required to the adjoining streets?

THE LECTURER: I will take the question of streets first. It is very difficult to work out the exact densities on roads, but we have worked out that if you evacuated half the population from High Paddington in a space of fifteen minutes (which it is possible to do with the lifts, escalators, and so on), it seems that you would get, from each of the main entrances to the town, one bus-load every two minutes, and one person on the pavement every second, all for the duration of fifteen minutes; these are, of course, very relative figures. What effect this would have on the existing roads I am not prepared to say at this juncture.

The cost per cubic foot is another difficult question. We have not worked it out in quite that way. But the cost in money of the scheme as it is appears to be about double what is called the cost for a housing estate to house the same number of people. Yet of course the two are not really comparable, because with the one you just have houses, and you build upon agricultural land; and in the other you have got a complete town, with all its amenities, taking no agricultural land. Again, it is very difficult to compare costs in that way. Take for instance the cost of the housing the L.C.C. build on the outskirts of London. The cost to the L.C.C. is one thing, but there is a cost to the county in which they are developing, and to public utilities, which is quite another thing. To get a comparison, you would have to assess all kinds of costs together, and put that against the cost of High Paddington. One might have been able to do it by taking a cross-section of a new town; but no new town has been completed yet, with all its services, from which one could have taken a realistic cross-section. So although I have tried very hard to get a relationship of cost, it has proved extremely difficult to find anything at all which really compares.

With regard to sewage: the storm water can very happily, I believe, go into the Ranelagh sewer, which is on a direct route from the site; while for sewage, there is, a short distance away from the site, the Middle Level Sewer; it is one of the main sewers that connects up to the Northern Outfall. I believe that, in the days when those sewers were designed, they were prudently designed to take a very considerable quantity of sewage!

Concerning fire regulations—the fire risk need not be unduly great. The fire-load grading of occupancies has been carefully balanced with the structure and materials used; a sprinkler system with automatic alarms, reinforced with hydrants at strategic places, is provided throughout the whole scheme; the scale of the enterprise warrants pumping stations, capable of providing suitable water pressure at any height in the building, as well as fire-fighting personnel specially trained in local conditions, similar to those found in any other small town. My personal view is that the risk of fire presents no obstacles which cannot be reasonably and efficiently overcome, if the desire to do so is strong enough—I cannot, of course, say whether the L.C.C. will agree with me.

MR. F. T. BUSH, A.R.I.B.A.: Could Mr. Kadleigh tell us what has been the experience of building in the way of Le Corbusier's scheme at Marseilles, and in what way it is a parallel to this project?

THE LECTURER: It is difficult at this range to find out what in fact has been the experience. As you know, there has been a great deal of controversy about the scheme, but I believe that a Paris newspaper sent representatives to live there for quite a long time and report their experiences, and the result was a glowing tribute to the building. Of course, their own country have handed an even more glowing tribute to Le Corbusier, the architect, presumably for this achievement amongst other things—and so has ours, if it comes to that. But it is difficult to say what the real experience has been, as it has not been up long enough.

As to whether it is comparable with this project: the Marseilles "*unité d'habitation*" is designed, I believe, for about 2,000 people, as opposed to 8,000 in High Paddington. Therefore it is about a quarter the size. This change in scale I consider to be one of the most significant things about High Paddington. On the Marseilles building the ground floor, as it were, is the concrete *pilotis*, which are very fine but very expensive; and it is difficult, practically, to justify that expense. By changing the scale, in High Paddington, the area represented by the Marseilles flats *pilotis* becomes big enough to take all the industrial and commercial elements of the town; and instead of using a third of the steel in the whole building for the admittedly very pleasant purpose of freeing the ground, here you have freed the ground in order to give you a 5 per cent return for the whole of your capital.

Further, because of the bigger scale of High Paddington, the shops need not be in the middle of the building, as at Marseilles, but can be round the town centre, and therefore be road served, which is a great advantage. Also the balcony *brise-soleil* forming the face of the Marseilles flats can, because of the larger scale, now become terrace gardens, which are much more useful to us, especially for children. So I believe that, by taking a bigger scale, one which is commensurate with a complete neighbourhood unit, and taking the many aspects of a town together, you get these fundamental economies in the basic conception.

MR. L. J. SYMONDS: The principle of the multiple use of land, which is at the root of this scheme, is I think one which we must make every effort to follow. The fact that this scheme is to be placed over a goods yard is perhaps more or less incidental, inasmuch as the goods yard happens to present the area of ground most convenient for the work in question. But presumably this is going to involve a very considerable alteration in the transport services, to put it mildly; I suppose all that has been allowed for. However, I have felt that in all the discussion of the question it has been perhaps surprising that the railways themselves have not been mentioned. Perhaps we could have just a word on the attitude of the transport engineers and operating staffs to this question. I suppose there will have to be, for instance, electric or diesel working introduced, since Paddington is at present mainly worked on steam.

THE LECTURER: It would not necessarily require the use of diesel locomotion. There are means of dispersing the smoke and steam which engineers say are quite satisfactory. As far as making alterations to the transport system is concerned, as the scheme is at the moment designed, the present system can operate perfectly well without having to stop because of the building; in other words, the building of this project is without prejudice to the working of the railway. When it is built, changing the railway track to a different allineation of systems of sidings and so on can be carried out quite effectively within the covered area provided.

MR. SYMONDS: So really there are no problems at all arising from the fact that it is built over a railway?

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THE LECTURER: There are always problems; but there are no insuperable problems.

THE CHAIRMAN: It only remains for me to express, on your behalf, our thanks, not only for the lecture, but for the admirable way in which the very wide range of questions has been answered.

I should like to add my own personal appreciation. There is perhaps in our minds just a little tendency to compare this scheme, which is something new with those schemes which are partly comparable elsewhere. As soon as high buildings come under discussion, we immediately think of the United States. Perhaps, Sir George, I am a little more up-to-date with regard to the Empire State Building. I think I am right in saying that the early difficulties in letting it have been overcome, and that it is now fully occupied. You see, a number of floors—I think around the sixtieth—remained untenanted until a group of people came along who really appreciated being up high and seeing the world . . . so they are now the home of the United Kingdom Permanent Delegation to the United Nations!

SIR GEORGE PEPLER: We pay their rent!

THE CHAIRMAN: I once had an office on the 55th floor of the Rockefeller Building, and I should just like to mention a difficulty which was not brought up. The difficulty was that I never did any work; I was always too fascinated looking out at the scene through the window on to smoky New York below. That does not matter, of course, if the building is residential.

Those New York buildings are, of course, office buildings, and so what happens? The Empire State Building, to take an example, somewhere about five o'clock, has 6,000 people all trying to get out of it at once, and then all trying to get into the subway at once, or into buses, and then ascending to the 10th floor, or whichever it happens to be, of their own block of apartments some distance away. There, I suggest, you have the worst of several worlds, which a neighbourhood unit as described by the lecturer would obviate. Surely this is an opportunity of improving upon the mistakes which have been made elsewhere?

As other speakers have said, I feel that, whether this is the right answer or not, it is a bold experiment which at any rate we should try.

With regard to the failure of British or other lifts, of course they fail. They failed in New York—why? Because there was an elevator operators' strike, which is quite different from mechanical defects. I have great faith in engineers to-day; they are not the ones to let us down. It is the human beings who let us down.

Once more, on behalf of the Society, may I thank you very sincerely for coming here and giving us such a fascinating afternoon.

The vote of thanks to the lecturer was carried with acclamation and the meeting then ended.

GENERAL NOTES

MEXICAN ART AT THE TATE

"Never in my life"—wrote Dürer after seeing the Mexican treasures sent by Montezuma to Charles V—"have I seen anything which has so made my heart leap in me as these wonderful and artistic objects". That surely must have been the response of many of those sixty thousand visitors who have seen the Art of Mexico, from pre-Columbian times to the present day, during the first four weeks of the exhibition at the Tate Gallery. Sponsored by the Mexican Government and the Arts Council, and most imaginatively displayed, it remains open until April 26th.

It was Roger Fry who observed that, whereas every phase of life in ancient Mexico seems imbued with religious sadism, and the content of the art, the subjects depicted, are often of revolting cruelty, "the plastic idiom, the quality of the curves, the choice of proportion and so forth, arouse in us feelings of an almost contrary kind . . . a feeling of serenity and calm". That is true. For all their primitive superstitions, the Indian tribes provided highly skilled craftsmen evolving, in their several territories, quite distinctive art forms, products of a society highly developed in its own way. In the dim, spot-lit Sculpture Hall it is fascinating to discover the Matisian distortion of an archaic terra-cotta nude, or some human skull encrusted with turquoise; but more moving far to find a sculptor giving us, here a gravely intellectual Mayan mask, there a squatting wrestler revealing the subtlest beauty of form responsive to the Olmec's sensibility, and imbued with that "serenity and calm" that belongs to ageless art.

Because so many of the simplified, stylized forms of pre-Columbian sculpture have this timeless character, "how modern they are" is the phrase on every visitor's lips. Yet it is, perhaps, the questing spirit of Henry Moore that has drawn most nourishment from them. See how the implacable, abruptly turned visage of Chac-Mool, Rain Spirit of the Toltec-Maya culture, survives in some of Moore's recumbent figures. Observe how close to his abstractions is another Toltec sculpture, the *Head of a Macaw* with its pierced tunnels for eyes and mouth. But turn to the savage human faces with jaguar mouths, wrought in rare materials by the Olmecs who appeared from nowhere already artistically developed, and you will find no echo in European art. The faraway tribes, developing through the centuries in entire isolation, once more recede into mystery.

Cortes came, saw, and conquered, and for three centuries Mexico lay under Spanish domination. Spanish and Moorish idioms were absorbed into the indigenous art, and during the eighteenth century there flourished a Mexican baroque style of which a gilded retablo (the smallest of ten once possessed by a convent), glittering in the twilight of a gallery filled with sacristy treasures, is the most lavish example. With much that is extravagantly demonstrative in this Catholic art of the Colonial period there goes a genuine eloquence in such carvings as a painted Archangel, the hands upraised in rhetorical but still expressive gesture. Less fortunate was European influence on nineteenth century painting which saw the rise of academic art exemplified in the rather undistinguished panoramas of Velasco, as well as the popular appeal of José Posada's engravings.

We may admit to some disappointment also in the contemporary art, and not only because no sculpture could be shown, or mural painting transported, apart from fragments of Siqueiros' work. The truth is that far too many living painters are represented, so that in the further rooms one has the impression of a large, confused, and rather daunting art club. Here, at any rate, are often attempts to recapture the pre-Columbian spirit, not so much in the coarse and brutal expressionism, in earthy pigments, as in those more sophisticated works one instinctively labels school of

Paris—the Surrealist myths of O'Gorman, and the impressive and inventive paintings of Tamazo, familiar in reproduction. It is Tamazo, with a whole wall rightly to himself, who dominates this company.

There remains the Mexican folk art, the most publicized feature of the exhibition, and the most happily displayed. No doubt even to the most distant but civilized foreigner the cheapest chain-store toy would not be an object of wonder and delight, but recognized as something essentially mean in form and meretricious in appeal. Yet, though they can be had in Mexico for a song, the traditional vessels with handles half-suggestive of human ears or arms akimbo are really satisfying; indeed, they have greatly influenced a sculptor as serious as Mr. John Skeaping, who lived among the Zapotec potters, sharing their kilns and learning the native method of firing the clay to impart such hues as leaden grey, and incising the surface with decorations most apt to the form. For the rest, the popular wares of gilt, blue, white, and crimson lake are often ingenious and whimsical, and even Death, gayed in a fantastic carnival figure, grins through a skull of marzipan adorned with icing ornaments. A mysterious and wholly absorbing exhibition.

NEVILLE WALLIS

THE BRITISH AGRICULTURAL HISTORY SOCIETY

The British Agricultural History Society, which has been formed to unite those who are interested in the history of rural life in all its aspects, and especially all the details of farming, is to hold its first general meeting at the University of Reading, on Monday, 13th April, 1953. Papers will be read by Sir James Scott Watson on "The Scope of Agricultural History", and by Sir Francis Stenton on "The Manor in English History".

Details of the conference may be obtained from Mr. J. W. Y. Higgs, Secretary to the Society, who is Keeper of the Museum of English Rural Life, at Shinfield Road, Reading, Berks.

A CHEMICAL SOCIETY AWARD

The Chemical Society has announced the offer of its Corday-Morgan Medal and Prize for 1952. This award consists of a Silver Medal and a monetary prize of 150 guineas. It is made annually to the chemist of either sex and of British nationality who, in the judgment of the Council of the Chemical Society, has published during the year in question the most meritorious contribution to experimental chemistry and who has not, at the date of publication, attained the age of thirty-six years.

Copies of the rules governing the award may be obtained from the General Secretary of the Chemical Society, Burlington House, W.1. Applications or recommendations in respect of the award for the year 1952 must be received not later than 31st December, 1953.

OBITUARY

J. W. TOPHAM VINALL

We regret to record the death, on 21st March, of Joseph William Topham Vinall, at the age of 79. Mr. Vinall was well-known as a versatile creative artist; he was, in addition, a teacher of art, an author of a number of publications on the subject, and the organizer of many art exhibitions both in this country and abroad. Among his best known works were pastel studies on brown paper of the interior of Westminster Abbey shown in a one-man exhibition in 1927, entitled "In and Around Westminster", consisting of 96 paintings, water-colours and pastels, of which 32 have been permanently placed by the Australian Government in the Federal Parliament House at Canberra.

He was elected a Life Fellow of the Society in 1913.

FROM THE JOURNAL OF 1853

VOLUME I. 8th April, 1853

Fellows may recall that it was during the course of the Exhibition of Photography to which the following notice refers that the Royal Photographic Society, which is this year celebrating its centenary, was formed.

PHOTOGRAPHIC INSTRUMENTS

It will be remembered by the Members of the Society, that an Exhibition of Photography was opened in the Society's Rooms at Christmas last, by which considerable interest was excited in favour of the Art, and it also gave rise to much inquiry relative to the processes and instruments employed in producing the pictures. The Council have, with a view to affording the information then sought, caused a collection of cameras and instruments to be made, which is now opened for the inspection of any of the Members or their friends who may be desirous of examining them. The cameras exhibit several new principles of construction, intended to increase their general efficiency, portability, and cheapness. Plans for the construction of printing-frames, stereoscopes, etc., are included in the collection.

Some Meetings of Other Societies

TUES. 7 APR. Manchester Geographical Society, 16, St. Mary's Parsonage, Manchester, 3. 6.30 p.m. S. M. Haffar : *Syria*.

WED. 8 APR. Petroleum Institute of, 26, Portland Place, W.1. 5.30 p.m. W. C. Dickerman : *The Present Status of the Art of Cracking*.

Photographic Society, Royal, 16, Princes Gate, S.W.7. 7 p.m. R. G. Fennah : *Animal Portraiture*.

THURS. 9 APR. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. A. M. Spooner and T. Worswick : *Special Effects for Television Studio Productions*.

Modular Society, at the Royal Society of Arts, W.C.2. 7.30 p.m. *Modular Coordination* (Discussion).

Photographic Society, Royal, 16, Princes Gate, S.W.7. 7 p.m. P. Cardew : *The Teaching Film from Script to Screen*.

FRI. 10 APR. Mechanical Engineers, Institution of, Storey's Gate, S.W.1. 5.30 p.m. W. Abbott : *The Athlone Fellowship Scheme for the Practical Training in Industry of Canadian Engineering Graduates in Great Britain*.

Public Analysts and Other Analytical Chemists Society of, at the George Hotel, Edinburgh 2. 7.15 p.m. Miss C. C. Miller : *Modern Methods of Analysis in the Training of the Student*.

SAT. 11 APR. Chemical Engineers, Institution of, at the College of Technology, Manchester. 3 p.m. F. H. Garner, S. R. M. Ellis and A. J. Hugill : *Efficiency of the Kashade Distillation Column*.

MON. 13 APR. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. *The Relative Merits of Broad-Band Transmission* (Discussion).

Purchasing Officers Association, at the Royal Society of Arts, W.C.2. 6.30 p.m. *The Merchant's place in Business*.

TUES. 14 APR. Chemical Engineers, Institution of, at the Geological Society, Burlington House, W.1. 5.30 p.m. G. G. Haselden : *The Fractionation of Liquid Air*.

Manchester Geographical Society, 16, St. Mary's Parsonage, Manchester, 3. 6.30 p.m. J. S. Duncan : *Canterbury, New Zealand*.

Mechanical Engineers, Institution of, Storey's Gate, S.W.1. 5.30 p.m. W. M. Heynes : *The "Jaguar" Engine*.

WED. 15 APR. British Kinematograph Society, at Film House, Wardour Street, W.1. 7.15 p.m. G. J. Craig : *Eastman Colour Negative and Colour Print Films*.

Folk-Lore Society, at University College, Gower Street, W.C.1. 7.30 p.m. Miss M. Dean-Smith : *Folk Play origins of the English Masque*.

Locomotive Engineers, Institution of, at the Institution of Mechanical Engineers, Storey's Gate, S.W.1. 5.30 p.m. B. Reed : *Running Tests of a 500 h.p. Diesel Mechanical Locomotive*.

Photographic Society, Royal, 16, Princes Gate, S.W.7. 7 p.m. Nettie Moon : *Pictorial Portraiture*.

THURS. 16 APR. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. B. L. Metcalf and G. Cuttle : *The Technique and Development of Automatic Winding in Mine Shafts*.

Photographic Society, Royal, 16, Princes Gate, S.W.7. 7 p.m. G. W. W. Stevens : *Latent Image Distribution*.

Royal Asiatic Society, 56, Queen Anne Street, W.1. 4.30 p.m. Prof. Gordon Childe : *Some Aspects of the Prehistory of Upper Eurasia in the light of recent Soviet discoveries*.

FRI. 17 APR. British Sound Recording Association, at the Royal Society of Arts, W.C.2. 7 p.m. D. T. N. Williamson : *Sound Reproductions*.

Mechanical Engineers, Institution of, Storey's Gate, S.W.1. 5.30 p.m. J. R. Bright : *Materials Handling*.

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